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The MONTHLY REVIEW

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American Electroplaters Society

DETROIT NUMBER

A SOCIETY FOR THE ADVANCEMENT
OF THE
SCIENCE OF ELECTROPLATING

JANUARY, 1925

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RESOLUTIONS

Hedley Richards

This New Year, 1925, I've made some resolutions;
Some mighty good resolves I've made, improving evolutions.
I'm going to read up on books that's just chocke full of science
And fill my noodle full of sense and knowledge of reliance.
I'm going to improve my golf, and do some wondrous driving.
In fact, in putting on a rug, I'm showing form surprising.
I'm going to reduce in weight, and regulate my diet,
And lessen my circumference, and eat no pie nor buy it.
In business I'll be right on deck, and work just like a nigger,
In order that my bank account may show a goodly figure.
My plating knowledge I'll improve, and be an educator,
So that on plating dope I'll be the great illuminator.
All these things I am going to do in 1925,
And next year I will tackle more, if I am still alive.

MONTHLY REVIEW

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EDITORIAL

THOUGHTS FOR THE NEW YEAR

This issue of the Review is the first one of the New Year 1925, and in the customary way we would extend to every member of the A. E. S. a wish that they may enjoy through the year the blessing that all seek after, **Happiness** and **Prosperity.** With this wish we might add this suggestion, That Happiness and Prosperity come to us largely because we have learned to obey the laws that bring them. The greatest measure of Happiness comes to us when we have labored or sacrificed to make others happy. What is our personal program for the New Year? What lessons will we learn from the mistakes of the past year? What will a personal inventory teach us? The following is offered as food for thought:

TAKE account of your personal abilities—your gifts, talents, forces, equipment. What per cent are you using? Most people are not using over twenty per cent of their capital of personal power. The eighty per cent lies dormant. Why have only twenty per cent of your share of Life, Success, Harmony and Happiness when you should have 100 per cent? There are big prizes awaiting your latent powers. At every turn of the way you can read the sign: 'Wanted Men With Power.'" —DELMER EUGENE CROFT.

PRESIDENT'S MESSAGE

At the inception of this, our Society, about 15 years ago, we pledged ourselves to devote all our energies to making each year in the plating industry a brighter one than the previous year. It seemed to us then that we could set up no more EXACTING PROMISE than that of AIMING at a constant improvement. It seems to us today on the threshold of another year that WE can scarcely do more than to BIND ourselves to a steadfast continuance of the same program.

As you all know, our profession is one of many conventions, traditions, superstitions and dogmas, some of which you read about and like, and some you disbelieve and dislike, and we also know to take all these beliefs for granted would be in this fast-changing age to court disaster—for instance, not many years ago platers would not divulge their trade secrets, and wives and daughters were not interested in the father's and husband's business, but look at our annual conventions nowadays, and see how equally interested men and the women of our families are in the FUNDAMENTALS of their livelihood.

The continuance of our principles—Truth, Co-operation and UNSELFISHNESS—will soon conquer the resistance of the non-member plater executive and cause him to seek our fold, and will also establish confidence in the manufacturer, and in this way bring forth things dealing with ideas, emotions and facts that are close to the every day life of the plater executive who, by thought, will produce many new things for the Bureau of Standards to experiment on for the next conference at the Bureau.

It is well too for the membership to remember, that at the start of this society a great many men with chemical and sales experience joined this Society in faith and sincerity of purpose, and together with the practical plater have helped to make permanent this GREAT EDUCATIONAL SOCIETY OF PLATER EXECUTIVES, and both of these classes of members gave unselfishly of time, experience and much patience, at a time when numbers and enthusiasm were worth more than money in dispelling the lack of understanding that existed in our profession at that period,

(Concluded an page 21)

PROGRESS REPORT OF THE DETROIT BRANCH RESEARCH COMMITTEE

In response to a request from the Supreme President, Mr. Sterling, for co-operation with the Research Committee of the Supreme Society, and with the Bureau of Standards on its research work on electro-deposition, at the January meeting of the Detroit Branch the members listed below were appointed as a local Research Committee. At a subsequent meeting of this committee a definite plan of the future scope of its activity was adopted covering the following:

1. To collect data from the members as to what phases of electroplating, in their opinion, need special investigation to be of direct assistance to them individually.

2. To take steps to secure any such information as far as our own resources permit and to pass forward to the National Research Committee, and to the Bureau of Standards a statement of the need of such information.

3. To co-operate with the Bureau of Standards in trying out in plant practice such advances in the science as they may develop experimentally.

4. To bring to the attention of the members by special reports the results and information obtained by the several research units.

5. To assign to members whose interests and facilities make it possible subjects of general and individual importance for their investigation with the co-operation of the committee.

A questionnaire was then drawn up and sent to every member and non-member plater in the city, asking for the information indicated above. From the replies received a statement of needs for future research was forwarded to Dr. Blum. Where definite information was asked for, subjects were assigned to various members, who responded generously with papers in the form of special reports on these subjects taken from their experience. These subjects and the papers thereon were also made the basis of the programmes of the regular monthly meetings.

The committee feels that the effort expended in this work was amply compensated in results shown by more active interest in the regular meetings, by stimulation of

general interest in research and the advanced ideas being brought out by research, by broadening the influence of the society with the technical staffs of several large manufacturing concerns, and the cementing of a very cordial relationship among the officers, committee, and members of the branch.

It was quite natural that it soon developed that the committee was somewhat handicapped for lack of funds for stationery, printing, postage and stenographic work with which to follow up with greater effect the work as started. This resulted in consideration of methods for increasing our funds and finally evolved into the proposal for the establishment of the sustaining membership.

Detroit Branch was very much disappointed that the sustaining membership idea was not adopted, but we have since come to realize that as proposed it was not drawn up in proper shape to meet the needs and ideals of all sections and factions of the society. We believe, however, that the idea is fundamentally sound and constructive and that some more acceptable form should be adopted at Montreal next June. The recent inauguration of the plan for a branch delegate to each Bureau of Standards Conference will probably bring out more clearly the need of funds for the work of local and the National Research Committees. We appreciate the wisdom of President Hanlon in putting this important matter in the hands of a committee of past presidents, who, from their own broad experiences in society affairs, will be best able to draw up a suitable proposal.

This Detroit Number of the MONTHLY REVIEW is made up of a number of special reports of the research committee and is fair evidence of the quality of its accomplishment of the past year. We feel that we have indeed accomplished much, but not as much as we had hoped. We offer this report as a suggestion to other branches wishing to stimulate the activity and interest of its members and non-members. We would also welcome any suggestions or criticism from other branches which would guide us in our efforts at greater accomplishment for the coming year.

Dec. 12, 1924.

E. G. LOVERING, Chairman.

USE OF LEAD AND GLYCERIN FOR BRIGHT NICKEL

Special Report No. 7—Research Committee

R. L. Shepard

The use of lead and glycerin for producing bright nickel deposits was first suggested to the writer by Mr. H. B. Brockway. He had found that after making a hot mixture of glycerin, boric acid solution, and litharge, cooling and settling, the clear liquor when added to his regular nickel solution, gave him an excellent bright nickel deposit. This process as then presented had the disadvantage of being of uncertain composition, and also that after each addition of the brightener, the deposit came black for some time before giving a satisfactory plate.

However, based on the above, the following system of treating and controlling a solution was worked out to give a bright nickel plate on polished brass, which was operated satisfactorily for several months.

The plating solution treated was of the very ordinary type, consisting of the following:

Single Salt	24	oz. per gal.
Nickel Chloride	1½	" " "
Sodium Chloride	2	" " "
Boric Acid	1½	" " "

It is not thought that the exact formula is important, as long as it is of the single salt type and contains boric acid. An attempt to brighten a double salt solution was unsuccessful, perhaps for the reason that it contained no boric acid.

As a convenient method of introducing and handling the lead, a stock solution of 20 per cent. lead acetate was made up. When freshly prepared from the commercial salt this solution is cloudy, with a percipitate of basic lead acetate.

To clarify the solution a small amount of acetic acid is added.

The first addition of the brightener should be at the rate of:

Glycerin, ½ oz. (fluid) per gal.

20% Lead Acetate, 3 oz. (fluid) per 100 gals.

The above are first mixed with a pailful of water, the glycerin being added first and well mixed, followed by the

lead acetate. This solution is then added to the plating tank and well stirred. The bright plate will be obtained immediately thereafter and hold up for several days.

When the plate begins to be dull again it is an indication that the solution needs more lead. This is then added at the rate of 1 oz. per 100 gallons of the 20 per cent. lead acetate solution, which restores the bright plate. If the 20 per cent. solution is added directly to a bucket of water the basic salt immediately precipitates. If, however, a pint of glycerin is first added to the water when the lead solution is added, it remains completely dissolved. With every addition of lead solution then a pint of glycerin is also added.

When a subsequent addition of lead solution fails to bring up a bright plate it is an indication that more glycerin is needed. This is added at the rate of ¼ oz. per gallon, first diluted in a bucket of water, or solution.

Other factors of temperature, time, current density, method of wiring or racking, and tank load affect the brightness of the deposit, but proper working conditions can be established by trial. The proper degree of acidity is very important. Too alkaline a solution will nullify the effect of the brightener, and too acid a solution is unnecessary and undesirable. The proper acidity is that of ordinary working conditions for good plate, that is, 5.7 to 5.8.

The brass parts must have a high color before plating. If carefully operated and controlled by the above method, 75 per cent. to 90 per cent. of the work will pass without a color buff. The plate itself is very soft and malleable, and when cloudy will color very easily.

March 20, 1924.

CORRECTION OF DR. BLUMS' PAPER IN DEC. REVIEW

On the bottom of page 4 a line of type was omitted. The last sentence should read "The principal compounds used in commercial cleaners are sodium hydroxide (caustic soda, NaOH), sodium carbonate (soda ash, Na_2CO_3), tri-sodium phosphate (Na_3PO_4), sodium borate (borax $Na_4B_2O_7$), sodium silicate (water glass, Na_2SiO_3), rosin and soap."

NICKEL PLATING RADIATOR SHELLS

Detroit Branch American Electroplaters' Society, Special Report No. 11—Research Committee

W. A. Shepherd

A successful process on above parts made from a good grade of rolled steel

(1) Wrinkles, die marks and short buckling "roughed off" where and if necessary, using No. 60 or No. 90 alundum, as required, on a 14"x2½ rag polishing wheel.

(2) Whole shell then "fined," using No. 120 alundum, dry, on a 14x2½ polishing wheel.

(3) Next "fining," using No. 150 alundum, dry, on 14x 2½ "Felt Sub" polishing wheel.

(4) Then "first oiling," using same wheel used in preceding operation, this time using grease stick or No. 180 emery cake.

(5) Final polishing operation, "second oiling," using No. 180 alundum or pure Turkish emery and No. 180 emery cake on a 14x2½, whole disc, sewed and cemented sheepskin polishing wheel.

Note—All polishing operations at 1,800 R. P. M., and to make an angle or cross polishing lines of previous wheels. Less skilled operators will be enabled to produce satisfactory work in quality and quantity with these methods.

(6) After polishing, shells are cleaned in an electric cleaner, rinsed or dipped direct in a 20% muriatic dip, then a water brushing by hand with tampico brush where and if necessary, to remove any lumps of polishing composition which may adhere in bead or around holes and filler neck. This inspection with brush at water tank costs less than requiring polishers to finish work without leaving any grease smut on same, and is to remove the insoluble part of composition that may not have been removed by the cleaner. In some cases this may not be necessary, inspection will indicate.

(7) Shells now run in a cyanide copper solution:

3 oz. sodium cyanide
2 oz. soda ash
2 oz. copper cyanide
1 gal. water

Operating at 150° F. and at 4 volts, suspending same

upside down with two ½" copper hooks to get the maximum amperage on shell. A 12 to 15 minute run in above solution will give a copper deposit which will stand cutting down on buff without going through.

A denser solution in same proportion as above will permit more current and a faster deposit, but would be harder to manage.

(8) Next copper buffing, using a fine grade of tripoli composition, and pieced sewed bleached buff, 16X3 at 1800 R. P. M. cutting down across direction of last polishing operation and coloring clean in same operation.

(9) Clean in electric cleaner, dip in 25% muriatic dip, brush entire surface using soft tampico hand brush and water only, removing smut where same has not been removed in copper coloring. Strike shell, moving same in contact with work rod about 5-10 seconds at 6 volts in a cyanide copper cleaner.

2 lbs. sodium cyanide 96-98%
3 oz. copper cyanide
2 lbs. soda ash
12 oz. caustic soda
10 gal. water

Or any preferred "cyanide-soda cleaner" with a little copper in same. This is an all purpose copper striking solution, used previous to nickel plating especially on iron or steel.

(10) Now run shells 24 to 30 minutes at 2 volts in a double-single nickel solution, proportions about 8 to 6 with suitable amount of boracic acid and salammoniac (or salt) and standing at 10° Baume and 80 to 90° F., 70 however will give good results.

(11) Then nickel colored on a 12X2½ loose unbleached buff.

To produce a first class job on shells that will stand up and not deteriorate any faster than the balance of the body finish or the rest of the car, it is necessary that a rigid inspection of each completed operation be maintained.

The inspection of polishing operations to see that all marks that will not be covered up in copper buffing, without cutting through, be removed.

The inspection after copper buffing to insure a perfect

covering of copper is the only insurance against subsequent rusting. If any steel is exposed in this buffing the piece should be replated with copper.

The inspection after nickel buffing should be thorough to maintain the standard of the job.

This, of course, is not a "rust-proof process," but shells finished two years ago by above methods show no serious defects.

Note—Considerable expense is added in polishing radiator shells, due to the inability to control selection of cold-rolled steel used in the manufacture of these parts; also due to faulty press work, which often leaves buckling and die marks requiring extra polishing operations and the use of coarse grades of emery to remove same. In this connection simplification of certain features, in design, which would not appreciably change the general effect, such as slight increase of radius of corners, etc., and other corrections which would simplify drawing and forming operations in the press work, would make this part an easier polishing job.

Experience on pressed steel parts, other than radiator shells, made from a good grade of polished cold-rolled stock, same also being free from pitts and "cold shuts," and where design of these parts has simplified pressed drawing and forming operations, to the entire elimination of buckling and draw marks, demonstrates that pressed cold rolled steel parts as above can be given a high-grade finish with but one No. 200 emery (Felt or Sheepskin Wheel), oiling operation previous to plating.

May 2, 1924.

ZINC PLATING ON AUTOMOBILE RIMS

Detroit Branch American Electroplaters' Society, Special Report No. 21—Research Committee

Chas. W. Cunningham

Owing to the rigid inspection that the automobile makers are using at the present time, it is now necessary to subject our plating to a forty-eight-hour salt spray test. We are using the sulphate process and are getting a very fair deposit.

We have found by using the cyanide method that the

rims stand up in our salt spray test from forty-eight to ninety hours. Less zinc being used, the plating time is shortened and a much improved product is secured. This is on account of the better throwing power and the more closely adherent deposit.

We are about to install an automatic cleaning, pickling, electro-cleaning, cyanide strike and plating machine capable of handling from 10,000 to 12,000 rims per nine-hour day, which will insure us a standard time of cleaning, pickling and plating. This will eliminate the uncertain human element in handling.

Cleaning and pickling of rims are two operations that give the plater many hours of grief. In the manufacture of our rims, heavy lead compounds and parafine oil are used to lubricate the tools and dies. In order to remove mineral oils and lead compounds it is necessary to use a soap mixture along with the cleaner. Our cleaning solution consists of "Bruke Metal Cleaner," 6 oz. per gallon, and "Bruke Composition No. 3," 2 oz. per gallon.

Some of the steel comes to us as pickled and oiled flat stock, which is more often than not over pickled. When plated this shows up in a dark discoloration under the deposit and very little zinc is found in the corner or under the clinch on clincher rims. To overcome these defects it is very necessary to repickle the rims. Hot rolled sections are received with either heavy or light scale. This has to be taken care of by varying the time of pickling and the density of the solution. Our pickling solution consists of:

Sulphuric Acid, 1 lb. per gallon.

Rock Salt, ¼ lb. per gallon.

"No Gas," 25 lbs. per 1,000 gals.

The rock salt is ued as a brightener.

As an additional insurance that the rims are properly cleaned and pickled we have an electro-cleaning tank after the water spray section next to the pickling tank. This cleaning solution consists of sodium hydroxide, 4 oz. per gallon, and sodium cyanide, 2 oz. per gallon. This removes all grease left by the first cleaning solution and any acid black left on rim by the pickling.

The strike solution used is as follows:

Zinc Cyanide, 8 ozs. per gallon.

Sodium Cyanide, 6 ozs. per gallon.

Sodium Hydroxide, 4 ozs. per gallon.

The anodes are all made of the best Prime Western Spelter with 1 per cent. Mercury.

The plating solution or finishing solution is composed of:

Zinc Cyanide, 5 ozs. per gallon.

Sodium Cyanide, 3 ozs. per gallon.

Sodium Hydroxide, 4 ozs. per gallon.

The anodes are of the same composition as for the strike solution, but it is necessary to use two steel anodes to one of zinc to overcome the building up of zinc content in the solution. Slight additions of mercury oxide will be necessary when building a new solution until such time as the anodes give up their metal freely.

Time required for plating will vary with the condition of stock and type of rim. Straight rims are given a two-minute clean, three-minute pickle, one-half-minute electro-clean, one and one-half-minute cyanide strike, and four minutes in the main plating tank. Clincher rims are given one and one-quarter minutes clean, twelve minutes pickle, one minute electro-clean, two minutes cyanide strike, and five minutes main plating. The time in the main plating can be varied from four to eight minutes, to suit the character of the work and the weight of deposit required.

Eight-Minute Deposit Plated with Anodes of ½of 1% Mercury

	Zinc Per Rim	Time in Salt Spray
No. 3	12 Grams	72 hours
No. 4	12 "	Placed on roof July 19th, 1924, for outside test. Inspected and found O. K. Oct. 3rd, 1924.
No. 5	9 "	18 Hours
No. 6	11 "	48 "
No. 7	10 "	48 "
No. 8	11 "	48 "

Solution Analysis:

Zinc Cyanide	4.2 oz. per gallon
Total "	6.1 " " "
Sodium "	2.6 " " "
Caustic Soda	3.5 " " "

Eight-Minute Deposit With 2% Mercury Anodes

	Zinc Per Rim	Amp.	Volts	Time in Salt Spray
No. 10	9 Grams	90	4.2-4.5	30 Hours
No. 11	10 "	90	4.2-4.5	Placed on roof, rusted in 3 days
No. 12	15 "	150	4.5-4.8	48 Hours
No. 13	14 "	150	4.5-4.8	Placed on roof July 19th, 1924, O.K. Oct. 3rd, '24.
No. 14	14 "	150	4.8-5.0	48 Hours
No. 15	14 "	150	4.8-5.0	48 "
No. 16	20 "	202	5.0-5.3	77 "
No. 17	14 "	202	5.0-5.3	94 "
No. 18	15 "	205	4.6-5.0	94 "
No. 19	14 "	205	4.6-5.0	Placed on roof July 19, 1924. O.K. Oct. 3, 1924

Solution Analysis:

Zinc Cyanide	3.85 oz. per gallon
Total "	6.09 " " "
Sodium "	2.89 " " "
Caustic Soda	3.26 " " "

RESOLUTIONS

We pass the following letter on to the Readers of the Review for consideration, and we trust favorable action at Montreal.—Editor.

My dear Mr. Editor and friend:

There will be any number of new resolutions made by the members of the A. E. S. this year at the 1925 convention at Montreal. It is desired to offer one resolution which should be made and confirmed at that convention, and that is, that the 1926 convention be held in Washington, D. C. Dr. Blum and his associates are willing to sponsor the meeting and you know exceedingly well, by your personal visits, what is offered in the way of a meeting place and things of interest to see and enjoy. Can the Society afford to pass up this opportunity? What say you? I say—No!!!

Yours for Washington 1926.

GEORGE B. HOGABOOM

GOLD AND SILVER PLATING

Allan E. Shepherd, Detroit Branch American Electroplaters' Society

Quite a large subject. To thoroughly go into the subject we should take up the plating of aluminum, brass, copper, gold, iron, lead, silver, steel and tin.

In plating aluminum the acetate of lead dip has been found practical before the final gold or silver solution. For gilding or silvering brass: In Eastern practice the mercury dip has been used, whereas, in the West it has been discarded on account of the corrosive action of the mercury on the base metal. The substitute is an ordinary nickel deposit.

On copper the process has been as on brass, but in Western practice a heavy silver strike has been used rather than mercury quick dipping.

The method for gold: As a rule the only deposit on gold is gold. The fulminating process has been superceded with excellent results by building up gold content from anode in a cyanide solution by the porous cell cathode process.

Iron and steel: For iron and steel the process is identical. Where in the East a steel strike is employed, Western practice gives a nickel strike, a silver strike and then to the running solution.

Note—Both the novice and the more experienced plater will find that straight muriatic dip on iron or steel will solve many problems in plating these metals, especially the numerous steel compositions now in commercial use.

Stainless steel a perplexing problem to the industry: By making the object to be plated the anode in a muriatic pickle as a preliminary to the silver striking solution, no difficulty will be encountered.

The method for silver: As a rule silver will be cleaned by a good cyanide dip when it will be ready for the striking or running solution.

Tin is an easily cleaned metal and will take either a nickel or silver strike without involved manipulation.

When we must plate a combination of metals, such as Brittania metal, Psosphor bronze or Brass, different processes are necessary. It has been found that the Lovering cleaning and plating solution, which was described in the

Metal Industry in 1914, will produce a common base of copper which will, of course, take the same treatment as the solid copper in a gilding or silvering operation.

In this connection it is to be noted that Phosphor bronze, yellow and red brass, if coppered in the same solution, will produce a uniform base for the mercury dip.

As to the weight of the deposit: The practice used in Eastern silver shops when weight of deposit was determined by the original balancing of cathode with a given weight equivalent to deposit required. This method has not been superceded by any other more accurate or more facile process up to the present time. The Sangamo Ampere Hour Meter for above determination has given uniformly excellent results, in that the time required for a given deposit can be anticipated by a comparison of ohms. This method is based on Farradays law, which has been proved in general practice as efficient.

USE OF THE DISTRIBUTION BOX FOR BETTER PLATING

B. F. LEWIS

By definition of Haring and Blum, "throwing power" is the deviation between the current distribution ratio and the metal distribution ratio of two points upon a cathode at different distances from a common anode; further, this deviation between current distribution ratio and metal distribution ratio is expressed in per cent. of the current distribution ratio.

For practical purposes in estimating the throwing power of a plating soltuion, it is possible to assume that the "near" and "far" points on a cathode receive unequal quantities of current from the common anode, which quantities stand in the same **ratio** as the unequal distances of "near" and "far" points from the anode. For example: If the nearest point on a cathode is four inches from the anode, and the farthest point on the cathode is eight inches from the anode, the ratio of the **distances** would be 2:1, and as the current delivered at the near point would be twice as great as that delivered at the far point, the ratio of the current distribution must be 2:1, the same as the distance ratio. If,

then, we suspend **two** cathodes on the same work rod, and arrange a single anode, of sufficient size, between the two cathodes in such a way that one cathode is nearer the anode than the other, by measuring the distance of each cathode from the anode, we may calculate the **current distribution ratio.** Now, if we allow a current to pass through the solution with the above arrangement, more metal will of course, be deposited on the near cathode than upon the farther, and if the two cathodes be weighed before and after the passage of the current, the actual quantity of metal on each may be determined, and from these two quantities we may calculate the **metal distribution ratio.** Having thus determined the relative **currents** and the relative **metal** deposits on the two cathodes, we may calculate the throwing power according to the definition given at the beginning, providing that the cathode effiicency is close to 100%.

The calculation for a throwing power test is as follows:

Data:
Temperature 60°F.
Composition
Conductivity
Cathode Efficiency
Voltage
Appearance of Deposit
Current Dist. Ratio=4
(near point is 11.2 Cm .from anode and far point is 44.8 Cm. from anode. Then $\frac{44.8}{11.2}=4$
Weight of metal dep. on near point=.3295 Gram.
Weight of metal dep. on far point=.1117 Gram.
Metal Dist. Ratio=$\frac{.3295}{.1117}=2.95$
Then: $\frac{(4-2.95)\ 100}{4}$=Throwing Power=26.25%

In determining the influence of various factors upon the throwing power of nickel solutions, apparatus similar to that devised by Blum and Haring, was employed, the main difference being, that a roled nickel anode was used, with

platinum cathodes 2"X1", suspended 2 Cm. from the ends of the tank, thus permitting deposition on both sides of each cathode. This arrangement introduces condtions which would make it impossible to obtain results concordant with those obtained on apparatus of the original design, but it is nevertheless capable of giving closely comparative results. A single coulometer, consisting of an acid-copper plating cell with a cathode designed for convenient weighing, was placed in series with two cathodes. By the use of this arrangement it was found that the greatest cathode efficiency in the test tank, was obtained with a potential drop through the tank of 2 volts. This voltage was used in practically every test.

The first factor, which was studied as to its effect on throwing power, was temperature. The results are tabulated:

Throwing Power %	22.50	22.50	27.75	29.50
°F.	82	72	63	52

This test was on a solution containing:

10.45 oz/gal. Single Salt
1.89 oz/gal. Ammoniac Chlor.
1.00 oz/gal. Nickel Chloride

The cathode efficiency ranged from 95.0% at 52° to 96.7% at 82°. The deposits peeled at the lower temperature and pitted at the higher, indicating that the pH **must be varied with** changing temperature.

The next factor under consideration was the conductivity and metal concentration. It was found necessary to consider these two factors together, since by increasing the conductivity in the presence of the already high metal concentration, the deposits obtained were invariably peeled, consequently the metal concentration was lowered chloride. The solution containing 2.4 oz/gal. of nickel was diluted 1/3, reducing the nickel to 1.6 oz/gal, and ammonium chloride was added in increments of .5 oz/gal. The first additions failed to affect the throwing power materially, until the concentration of $NH_4 C_1$ reached 4.2 oz/gal, when the throwing power increased at once to 29.25% at 61°F, compared with 27.75% when the solution c ontained 2.4 oz/gal, nickel plus 1.9 oz/gal, ammonium chloride at 63°F.

On further diluting the solution and adding $NH_4 C_1$ to give the composition Ni 1.35 oz/gal, plus $NH_4 C_1$ 4.5 the throwing power increased to 31.5% at 65°F. A solution of this approximate composition was tried on die castings in a 45 gallon tank, and produced a good deposit in 10 minutes. The color was rather darker than desired, so it was not considered advisable to further increase the conductivity without also increasing the metal content.

The effect of gelatine was determined by adding .5 gram per gallon to a soltuion containing 8.0 oz/gal, single salt plus 6.0 oz/gal, $NH_4 C_1$ with a normal throwing power of 32.0%. Upon the addition of the gelatine the throwing power dropped to 17.0% and the cathode efficiency to 88.5% It was found, however, that the throwing power was good on recessed objects when agitated, so a test was made with agitation (air current) near the "far" cathode. This caused a further drop in throwing power to 11.00%. Similar agitation near the "near" cathode increased the throwing power to 32.75%. This indicates that the mechanical action of agitation has the effect of actually preventing to some extent the deposition of metal, so that if work can be agitated in such a manner as to keep the solution moving on exposed points of the cathode without distributing the solution in the recesses, better throwing power will result. This appears to be especially true of solutions which have a higher viscosity due, as in this case, to the presence of colloids. In the case of a nickel solution containing no gelatine, the normal throwing power was 33.00%. With agitation near the far cathode the T. P. was 30.25%. Here again, the actual quantity of deposited metal is less with agitation, but the throwing power is better where greater agitation is effective on the more exposed surface.

In studying the throwing power of any electrolyte it is not advisable to draw conclusions as to the effect of any one factor, as the effect may be the result of many factors which may or may not be known. The facts presented in this paper are the results of actual tests, rather than projections from theories; notwithstanding, the results are almost entirely in accord with logical forecast.

FOLLOW SUIT

The following is a copy of the letter sent by Chicago Branch to the Congressman from that district. Would it not be a good idea for other branches to send similar letters to their representatives at Washington?

Honorable Sir:

This Society, as you will note from this letterhead, is educational in its scope, and it has branches in practically all of the principal cities of the United States. These branches meet at least once each month, and the Supreme Society, in which all branches are represented, holds a National Convention each year. This representation, as well as the general membership, is composed of the foreman from any manufacturing plant where the nature of the product requires that it be electroplated to make it salable or as a preventative from destruction by corrosion, or both.

It will, therefore, become apparent that the work of the Society reaches practically all important manufacturing plants where metals are involved, and therefore you will appreciate also that this includes most concerns associated with the Illinois Manufacturers Association, and the National Association as well, and these concerns are interested in addition to the Membership of our Society from the standpoint that the research work carried on developes new ideas and processes through which all may benefit.

The Supreme Society has a Research Committee with which the Bureau of Standards cooperates, the last conference having been on last November 14th and 15th in the Electrical Division of the Bureau at Washington, and the records are available for your own information.

The present program of economy by our Government, we understand, has cut into that part of the Bureau of Standards having to do with Research work on the subject of the Electro-Deposition of Metals to such an extent that we very much fear this work is going to be seriously affected, and the industries referred to above suffer in consequence, whereas a more liberal attitude as regards available funds to carry on the work might result in the discovery of certain processes which would save infinitely more for these industries and as a consequence to the community at large, than the present economies in force.

We appeal to you, therefore, to give this matter your personal attention, and to use your good offices towards securing a more liberal allowance for this Department of the Bureau of Standards, since we are confident that such a procedure will result in much more benefit generally than any small amount which may be saved at this time.

Trusting that we may receive your comments on this situation to enable us to make proper report to the Society, of which we are a Committee appointed officially to make this appeal to you, we are

Respectfully yours,

E. LAMOUREUX, Chairman,
844 Aldine Ave., Chicago, Ill.
O. E. SERVIS
H. A. GILBERTSON

PRESIDENT'S MESSAGE

(Continued from page 4)

and like all organizations newly formed, the laws were very lenient as to the qualifications necessary to affiliate, and these have been by practice and experience since made more stringent, yet I feel that we practical members owe it to ourselves from NOW ON, if we have been remiss heretofore, to curtail all of the miscellaneous insinuations relative to certain classes of our membership, as it reflects upon our INTEGRITY as a whole and is only suppositional and erroneous, has no foundation, and is detrimental to our progress.

Yours truly,
FRANK J. HANLON,
Supreme President.

BRANCH NEWS

Detroit Branch

The regular January meeting was held at the Detroit Engineering Society Clubhouse.

Mr. W. M. Phillips, delegate to the Associated Technical Societies' Council, announced very promising activity on the part of its newly elected chairman, and the appointment of R. L. Shepard to its educational committee and himself to the publicity committee.

Mr. R. L. Shepard, also delegate to the council, reported that the Detroit Board of Education had requested the co-operation and promised its support to the council's educational program. The matter of establishing a class in elementary electroplating will be handled through this agency.

It was voted that the Detroit Branch believed in the establishment of a sustaining membership as a means of providing funds for the expense of the national and local research committees, and would support any form of amendment to the constitution pertaining thereto which would be satisfactory to the committee of Past Presidents, and to the National Research Committee.

It was voted that the Detroit Branch favored the extension of research on electroplating at the Bureau of Standards by increased Congressional appropriation rather than by the use of A. E. S. funds.

It was suggested as a subject for future research the development of a non-tarnishing nickel plate.

The subject for the evening was "Cleaners," covered by a round-table discussion featured by a very interesting talk by Mr. Baumonec. Mr. Baumonec recommended in particular the use of cleaners in small concentrations, such as one oz. per gallon, with high heat and good agitation by air, mechanically, or heat circulation.

Toronto Branch

The program prepared for our December meeting was of exceptional merit, and in spite of the fact that but two days intervened before Christmas Day we had a very satisfactory meeting and plenty of interest on the part of those present. Mr. John Acheson presented a very instructive and interesting paper on "Metal Cleaning for General Purposes," and the members earnestly discussed the subject with gratifying results. Copper cleaning and resultant oxidizing and staining was discussed. Action of cleaning solution on zinc die castings after prolonged use was also given some consideration. Soda ash was declared a good cleaner for highly polished brass surfaces. Mr. O'Keefe, our wide awake librarian, had a fine program for the evening, and everyone present enjoyed it. Mr. H. Cresswell suggested that members put questions in the Question Box, which could be used as subjects for discussion. This request is extended also to members residing out of Toronto, the subjects to be sent to the secretary.

Question—Radiator shells plated top down in double nickel salt solution replenished with single salt to maintain 10 degrees Be, and operated at 90 degrees F. to 96 degrees F. Cathodes mechanically agitated, 12½ amps. per sq. foot, have dark areas near center of top surface (lower surface in bath), resembling gas spots. This occurs only at certain intervals and on only a portion of shells.

Answer—Either inefficient cleaning around the opening for radiator neck or temperature of solution too high for a solution of this concentration, thus reducing throwing power affecting shells suspended near center of tank.

Mr. James Welsley of Stratford, Ont., one of our most progressive members, has sent us a model jig for bending a perfect two-point contact, V-shaped hook, for holders. This will be shown at our January meeting and a demonstration of its use will be made. We will also try to get blueprints for distribution among the members. The device is simple and its use enables the plater to have all hooks uniform and of neat appearance.

One of our members, who resides out of Toronto, suggests that we have a radio trouble chart. Problems and the solutions to be dealt with, hints and odds and ends of information scattered more through the REVIEW, etc. He says we seem to have a plentiful supply of books of formulas, tables and general rules, but we need more of the practical information. Don't you think he said something?

Bridgeport Branch

The regular meeting of the Bridgeport Branch, A. E. S., was held December 6, President William Flaherty in the chair. A discussion of the fall meeting of the A. E. S. and the Bureau of Standards took place. All the members agreed that the bureau had done some very good work, and the hope was expressed that their work would continue. Mr. Stratton told of his experiences with the sodium sulphate solution in connec-

tion with nickel plating. Stating that it is possible to get a very high amperage in mechanical plating, and a much whiter plate with the use of the bove salt.

Dayton Branch

The Dayton Branch held its regular meeting at the Y. M. C. A., January 3, 1925, with President Harter presiding, and without a doubt was one of the best attended in the history of the Dayton Branch. A good subject was presented by our librarian, Robert Susman, on ionization of a nickel solution or the P. H. value. This has been shown at different times by Dr. Blum of the Bureau of Standards, but because of his limited time, he could not do justice as he would have liked to. Mr. Susman showed curves and different amount of deposits at different P. H. values; also salt spray tests. Another surprise was Mr. Van Deran from Mansfield, Ohio, who came down with many samples plated in the correct P. H. value suited for his particular job. We all agreed with him that he must be correct, for he had samples of thin sheet steel that were bent to a break, but the nickel did not chip or peel. This sure was a good demonstration and topped off Mr. Susman's talk. The job was put over so good that Mr. Susman is to instruct the branch as a class at each meeting to show how to control by P. H. values.

It was reported at the meeting that Mr. Fraine was suffering from an attack of pneumonia, and the branch hopes for his speedy recovery.

There was much discussion on ionization of a nickel solution, and we are looking for large attendance at all our future meetings.

Providence-Attleboro Branch

At the first meeting in November of the Providence-Attleboro Branch a letter was received from the Research Committee of the American Electroplaters' Society stating that the fall conference with the Bureau of Standards would be held at Washington, D. C., November 14-15, and each branch should send a delegate or representative to obtain first-hand knowledge of the research work.

For the purpose of devising ways and means of securing a representative and raising funds for transportation a special meeting was held Tuesday evening, November 11, and Vice-President Ernest Alsfeld was elected to represent Providence-Attleboro Branch at the conference. It was voted to draw on the treasury to the extent of $25 to help defray the expense of the trip, and the members not at the meeting would assume a similar assessment to reimburse the treasury.

The following committee was appointed to bring in a report on the advisability of holding our annual banquet: Mr. Gavin J. Tyndall, Past President George Weigand, Past President John Garrick, Vice-President Ernest Alsfeld, Walter Pickels, Fred Grant, Robert Crook. The tentative plans are to hold an afternoon discussion period, followed by the banquet and dancing.

At the first meeting in December Vice-President Ernest Alsfeld gave a very good report on the conference at Washington. He told of the various representatives and interested members present. It was an educational convention, said Mr. Alsfeld.

Bridgeport Branch

The regular January Meeting was held on the 2nd, with an attendance of 25; President William Elaherty presiding.

The question of the best method for the analysis of brass solutions was discussed. The method as outlined by Mr. Sizelove in one of the recent issues of the Review was read, and some of the determinations tried out with very good success. Another simple method was suggested for the metal content of the solution. Take 25 c. c. of the brass solution dilute to 200 c. c. with H_2O and electrolize using weighed platinum electrodes, making cyanide additions if necessary, run until all of the brass is depleted which can be observed by lowering the cathode gradually into the solution . When the deposition is complete the top part of the cathode will remain unchanged. The weight of the cathode minus the bare weight will give the total weight of brass in the solution. The cathode is now striped, using about 5 c.c. of HNO_3 with about 20 c. c. H_2O (heating will hasten this operation), now add about 3 c. c. H_2SO_4 dilute to 200 c. c. and electrolize in the manner as outlined above for cu. By substracting the cu. from the total wt. of brass we get the Zn.

The speakers committee has secured Mr. Frank Townsend to speak on Polishing and Buffing Compositions at the open meeting to be held on January 16, 1925.

Cincinnati Branch

The meetings are attended fairly well, but there should be a better attendance. The Cincinnati Branch has splendid opportunitiies for advancement and plenty of equipment for experiments which means so much to the plater of today, but it takes time to make and show these developments which we hope to see. We meet in the Industrial Training School Building every Thursday evening. Drop in and pay us a visit. School is located at corner of Spring and Liberty Streets.

Rochester Branch

The meeting, December 18th was called to order by our President, Mr. E. Crowley, Jr., and after the usual order of business, the rest of the evening was enjoyed by a very interesting lecture by Mr. Harry Barnard on "Metal Cleaning and Cleaners", which was appreciated by everyone present.

The meeting January 10th was taken up mostly with the coming Banquet. Everybody is working hard to make it the best ever. We wish you to give the out-of-town members notice that we shall be most happy to see them present and will do all we can to make it pleasant for them.

Grand Rapids Branch

Grand Rapids Branch held its regular meeting January 14, at Vocational High School—fair attendance. One new member was elected and some very interesting topics were considered. Would like to see every member of this branch out to our next meeting.

New York Branch

President Fischer presided at the December meetings of New York Branch of the A. E. S. After the regular routine of business was dispensed with, a committee was appointed for the coming banquet: Mr. J. Minges, chairman; G. B. Haddow, B. Popper, P. Moringstar, N. Schinder, H. C. Flanigan, J. Burke, D. Downs and S. Schubert. Mr. G. B. Haddow read an interesting paper, in which he gave an historical review of lacquers and their uses. Mr. C. H. Proctor paid us a visit and spoke on some very interesting plating problems he met during his travels throughout the country. Mr. C. H. Buchanan also dropped in and gave us some interesting matter concerning nickel anodes and promised to write a paper on nickel anodes in the near future. The preparation of aluminum die castings for electroplating was discussed at length. The castings containing from 3 to 9 per cent. aluminum. Several methods were recommended—a combination plater and cleaner, consisting of the following: Caustic soda, 5 ozs.; cyanide, 1½ ozs.; copper cyanide, ¼ oz.; zinc cyanide, ¼ oz. to the gallon. Solution is kept at the boiling point, using about 6 volts, striking die castings about 30 seconds. Another combination plater and cleaner recommended is as follows: Soda ash, 10 ozs.; cyanide, ½ oz.; very little metal used in this solution. It was also suggested to plate the die castings in a zinc cyanide solution and transfer to a brass bath. Still another suggestion was to plate the die castings in a solution consisting of nickel chloride 6 ozs.; ammonium chloride, 4 ozs. The nickel plating of zinc was also taken up after discussing this problem. The following solutions were recommended for nickelizing zinc: No. 1—Nickel chloride, 8 ozs.; ammonium chloride, 8 ozs.; water, 1 gallon. No. 2—Double nickel salts, 8 ozs.; sodium chloride, 4 ozs.; sodium citrate, 3 ozs.; citric acid, 1-16 oz.; water, 1 gallon. A mild cleaner for zinc recommended is as follows: Sri sodium phosphate and soda ash in equal proportions, from 4 to 8 ozs. per gallon.

It will be of interest to A. E. S. members to know that Mrs. John E. Sterling, wife of our past president, is improving as well as can be expected from the injuries received in an automobile accident last summer. We hope for her complete recovery.

Philadelphia Branch

The regular monthly meeting of Philadelphia Branch was held Friday, January 9, meeting being called to order by the president, George Gehling, with a good attendance.

Mr. Graham continued his course of lectures, the subject being "Analyzing of Nickel Solutions."

Mr. Samuel Barr spoke on "Carbonates in Cyanide Solutions," and advised freezing them out, as they are detrimental.

Two applications were received.

Messrs. J. A. Munning and W. J. Bell, who have been on the sick list, are now convalescing. Our best wishes go out to them for a speedy recovery.

Cleveland Branch

The Cleveland Branch met at the Hotel Winton for their regular January business meeting. The meeting was called to order at 8 p. m. by President Scott. This was the second open meeting that is open to platers that can qualify to become members. We received the application of C. E. Marker, 1177 Cook avenue, Lakewood, Ohio, and it was turned over to the board of managers. Albert Schultz's application was held over until published in the REVIEW. Thomas Sweeney was elected to membership as an active member. It was decided to extend the membership drive to June 1, 1925, and that a smoker be held at our next meeting. There being no further business, adjournment was called for at 10:30 p. m.

Chicago Branch

Regular monthly meeting Chicago Branch, held January 10, 1925, at Atlantic Hotel, 316 S. Clark street. Meeting called to order with President F. J. Hanlon presiding, and a very good attendance. After reading of minutes, etc., President Hanlon called upon chairman of banquet committee for a report on same. Committee reports have secured papers by Mr. F. J. Liscomb, subject, "Nickel Anode Scale"; Mr. Cleveland F. Nixon, subject, "Analysis Notes." Mr. J. Haas of the Ontario Silver Company, Muncie, Ind., and Mr. John M. Glen, secretary of the Illinois Manufacturers' Association, who will speak on the proposed 20th amendment, Child Labor Law. Oxford quartet will furnish vocal and instrumental selections.

Subject of the evening was "Current Efficiency." Next subject will be "Acid Copper Solutions."

Waterbury Branch

Waterbury Branch, through its entertainment committee, is arranging for a series of "talks," to take place before the summer months set in. Already this season a number have been held, and they proved instructive, not only to the local, but members of the nearby branches as well. The "Question Box," a feature which has proved so interesting and instructive in many of the branches, is none the less popular here. The various problems which confront the plater during the day are brought up for discussion and threshed out, and the inquiring members generally get results and satisfaction. One question recently presented was discussed by those present, and it was decided to pass it on to members of other branches for such information as they could impart on the subject. The question was one as to **"what was the most simple and economical method for detinning."** Although it is an operation that is not very common around this section, a number of methods were mentioned. The caustic potash, reversed current, chlorine gas, ammonium sulphide and a few other methods were spoken of. In most instances of detinning the main object is to recover the tin, with no regards for the condition the metal is left in. In the local case the metal must be left in good condition, as a finish is to be put on it later.

ELECTED TO MEMBERSHIP

Toronto Branch

Al. T. Middelton .....12 Ryerson Ave., Niagara Falls, Ont.
Edw. E. Martin .....67 Hess St., North Hamilton, Ont.

Chicago Branch

Edward Bernhardt.....6605 South Francisco Ave., Chicago, Ill.
Maryos Tehranian .....1462 Bryan Pl., Chicago, Ill.
Arthur Sahl, Active .....210 N. Crawford Ave., Chicago
Peter Belson, Active .....3348 N. Clifton Ave., Chicago

Milwaukee Branch

Herman Peterson .....762 Hubbard St., Milwaukee, Wis.

Cleveland Branch

Thomas Sweeney .....3183 W. 95th St., Cleveland, Ohio

Rochester Branch

Geo. I. Onions .....5820 Main St., Williamsville, N. Y.

Cincinnati Branch

Alfred S. Lay .....503 S. Chestnut St., Marysville, Ohio

Grand Rapids Branch

Clarence E. Stimson, Active.....1306 Columbus St., Grand Haven, Mich.

APPLICATIONS FOR MEMBERSHIP

Chicago Branch

Arthur W. Sahl .....210 N. Crawford Ave., Chicago, Ill.
Peter Belson .....3348 N. Clifton Ave., Chicago, Ill.
Burton Burchfield .....4201 Melrose St., Chicago, Ill.
Jacob Chas. Hergenhahn, Associate.....212 W. Kenzie St., Chicago
George Morris, Associate .....2308 First St., Peru, Ill.

New York Branch

Henry T. Keifer .....83 Hancock St., Jersey City, N. J.

Philadelphia Branch

Frank G. Roeren, Active .....Richardson Ave., Langhorne, Pa.
Chas. A. Cooper, Active .....1427 Washington Ave., Chester, Pa.

Cleveland Branch

C. E. Marker.....1177 Cook Ave., Lakewood, Ohio
Albert Schultz

Milwaukee Branch

Fred W. Han .....Racine, Wis.

THE TWELFTH ANNUAL BANQUET

Of the Rochester Branch, A. E. S., will take place at the

POWERS HOTEL

FEBRUARY 14th, 1925

AT 6:30 P. M. $3.00 PER PLATE

Out of Town Members Take Notice—Come and Get Acquainted.

NEW YORK BRANCH BANQUET

WANTED

Everybody to attend the 16th Annual Founders' day and banquet of the New York Branch, American Electroplaters' Society to be held Saturday, February 21st, 1925, at the Aldine Club, 200 5th Ave., corner 23rd St., New York City.

Mr. Charles Procter, founder of this society, will have charge of the educational program, which will begin at 3 P. M. There will be talks by well-informed speakers, also interesting papers read and discussed on subjects relating to plating.

A special invitation is extended to manufacturers, together with their managers, superintendents, chemists and platers.

Ladies will be entertained all of the afternoon at the club. Banquet 7 o'clock.

C. E. STIERS, Publicity Manager,
45 John St.,
New York City.